

Misalignments: Cultivating Science Faculty with Education Specialties in Your Department

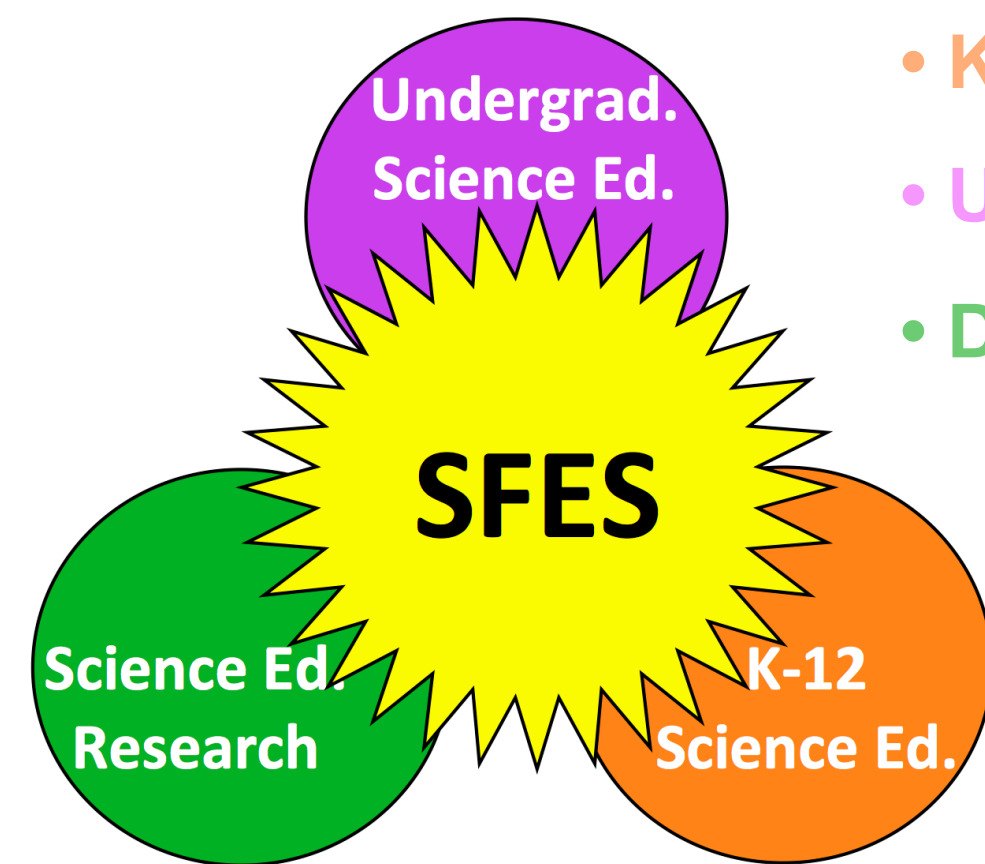
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Background

Science Faculty with Education Specialties (SFES) occupy a pivotal position in science departments at the interface of three arenas.



- K-12 Science Education & Teacher Preparation
- Undergraduate Science Education
- Discipline-based Science Education Research

SFES – faculty-level scientists who take on specialized roles in science education in their discipline ... more than do typical faculty members in science departments ^{1, 2, 3}

SFES positions are widespread and growing in the US. ⁴

SFES Phenomenon: Variation across institution types

Previous results⁴ indicate ...

SFES position structure –

- majority of SFES occupy *tenure-track* positions
- SFES respondents at *PhD institutions* were *less likely* to occupy T-T positions

Perception of activity times compared to non-SFES –

- SFES positions *not* reported to be primarily *teaching* positions
- SFES reported spending *more* time on *service* than their non-SFES colleagues
- SFES respondents at *PhD institutions* reported spending *more* time on *teaching* and *less* time on *research* than their non-SFES peers

Formal science education (SciEd) training – SFES respondents at *MS institutions* were *more likely* to have formal science education training.

Science education funding –

- SFES respondents at *PhD institutions* had the *highest funding success rates*
- No clear advantage of formal SciEd training in obtaining science education funding

Methods⁴

Recruiting SFES Participation

Conducted National SFES Search to identify broad pool of likely SFES
973 likely SFES registered between September 2009 and March 2011
841 likely SFES in the U.S. were invited by email to participate in this study, as well as forward the invitation to other likely SFES in the U.S.

Resulting SFES Sample

Individuals participated without compensation, and remained anonymous throughout data collection and analysis. Analyses presented here are based on data from 289 individuals with n-values for responding SFES varying per question
The resulting SFES sample was neither random nor comprehensive, but represented purposefully broad convenience sample.

Data Collection Methods

Developed 95-question, face-validated, anonymous, on-line survey
Opened survey to participants between March and June 2011
Probed factual information (e.g. demographics and professional training), as well as perceptions of SFES position with respect to teaching, research, service, and support using both closed- and open-ended questions
Responses to the four questions described here were investigated using grounded theory as an inductive methodology that leads to the emergence of ideas from patterns in the data.

References

- ¹Bush et al. 2006. CBE - LSE 5: 297-305.
²Bush et al. 2008. Science 322: 1795-1796.
³Bush et al. 2011. CBE - LSE 10: 25-42.
⁴Bush et al. 2013. PNAS 110: 7170–7175.
⁵Bush et al. 2015. BioScience 65: 81-89.

Findings raise critical questions about ...

- motivations for SFES hiring
- potential or actual impact of SFES⁵

... most common reasons that a science department *hires* an SFES?

“What would you consider to be three most common reasons that a science department hires a Science Faculty with Education Specialty?”
(n=259)

Preparation of future science teachers (40%)

Fulfill particular teaching role in department (33%)

Course/ curriculum development & reform (25%)

Improve student learning experiences, outcomes, recruitment, and retention (23%)

Being pedagogical resource for development and reform of faculty teaching (23%)

Why are SFES BEING HIRED? (perceptions) ⁵

- to prepare future teachers and fill a particular teaching role
- also to improve undergraduate science education
- not driven by desire to hire DBER (19%)

... valuable contributions that SFES *COULD* make to a science dept?

“What would you consider to be three most common reasons that a science department hires a Science Faculty with Education Specialty?”
(n=259)

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Course/ curriculum development & reform (25%)

Improve student learning experiences, outcomes, recruitment, and retention (23%)

Being pedagogical resource for development and reform of faculty teaching (23%)

“What are the three most valuable contributions that SFES *COULD* make to a science department?”
(n=245)

Being pedagogical resource for development and reform of faculty teaching (39%)

Course/curriculum development & reform (35%)

Cultivate departmental cultural change towards focusing on education in the sciences (29%)

Conducting educational research and broadening departmental research (27%)

Improve student learning experiences, outcomes, recruitment, and retention (26%)

What are perceived POTENTIAL SFES contributions? ⁵

- no single contribution mentioned by even half the participants
- strong potential roles for SFES ...
 - in the arena of UG Sci Ed, and for
 - cultivating departmental cultural change toward Sci Ed

... most valuable contributions that you (SFES) *ACTUALLY* do make to a science dept?

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“What are the three most valuable contributions that SFES *ACTUALLY* make to a science department?”
(n=249)

Course/curriculum development & reform (34%)

Being pedagogical resource for development and reform of faculty teaching (32%)

Improve student learning experiences, outcomes, recruitment, and retention (25%)

Cultivate departmental cultural change towards focusing on education in the sciences (20%)

Preparation of future science teachers (20%)

What are ACTUAL SFES contributions? ⁵

- UG Sci Ed
- pedagogical resources
- not research?

Critical Misalignments⁵

- **Teacher education** – perceived reason for hiring SFES (40%) vs. actual contribution (20%)
- **Fulfilling a particular teaching role** – perceived reason for hiring SFES (33%) vs. actual contribution (12%)
- **Conducting educational research** - not reported as a top reason for SFES hiring or actual contribution
- **Cultivating departmental cultural change toward Sci Ed focus** – perceived as potential (29%) and actual (22%) contributions, but not as strong reason for hiring

These misalignments may be driving ...

- the high % of SFES who reported seriously considering leaving their positions^{2,3,4} Increased rates of hiring SFES may, in part, be a reflection of high attrition rates⁴
- SFES reports of feeling underappreciated, out of step with their department or university, and that they aren’t doing what they aspired to be doing ⁴
- advice to others that clear position expectations should be obtained ⁴ (see box below)

Furthermore, these misalignments may have negative consequences for national efforts to advance science education in the US.

Voices of SFES: Advice offered to beginning SFES

“What are the three most important pieces of advice you would offer to a beginning [SFES]” (n = 50)

- **Find colleagues, mentors, and advocates (45%)**
- **Obtain clear expectations from dept. and college (27%)**
- **Pursue training and stay current in science and/or science education (23%)**
- **Inform, educate, and highlight your efforts among your faculty colleagues and administrators (22%)**
- **Have a clear vision of and follow your professional interests (19%)**

These findings suggest that effective and lasting science education reform may require a fortunate confluence of the right SFES, at the right time, in the right environment.

Future directions:

What is the nature of the academic contexts in which SFES thrive and what are SFES impacts? (Interview study of 50 SFES)

How do SFES perceptions correspond to those of administrators and non-SFES faculty peers? (Case studies of selected SFES)

Acknowledgements - We thank all of the SFES who participated in this research and our families for their ongoing patience and support. We gratefully acknowledge funding through NSF/DUE-1228657. In addition, MTS thanks the Scholarly Activities Committee of the College of Science and Health at Utah Valley University for funding.